

**REMARKS**

Applicants have amended their claims in order to further clarify various aspects of the present invention. Specifically, Applicants have cancelled claims 1-3 without prejudice or disclaimer. Moreover, Applicants have set forth each of claims 4-6 in independent form, and have further defined claims 4-6 respectively to set forth that R<sup>1</sup> is a linear or branched alkyl group having four carbon atoms, that R<sup>1</sup> is a linear or branched alkyl group having 8 carbon atoms, and that R<sup>1</sup> is a linear or branched alkyl group having 18 carbon atoms. Note, for example, Examples 1-3 on pages 13-16 of Applicants' specification. In light of cancelling of claims 1-3, Applicants have also cancelled claims 7 and 10 without prejudice or disclaimer.

Applicants have set forth claims 8 and 11 in independent form, reciting an organic gel comprising a triphenylmethane derivative of a specified structural formula, with claim 8 reciting that R<sup>1</sup> of the specified structural formula is a linear or branched alkyl group having 1-5 carbon atoms, and with claim 11 reciting that R<sup>1</sup> is a linear or branched alkyl group having 6-10 carbon atoms. Note previously considered claims 4 and 5. Claims 9 and 12 have been amended to recite that the organic fiber is "produced from" the organic gel as defined in claims 8 and 11, respectively.

Moreover, Applicants are adding new claims 13-26 to the application. Claim 13 defines an organic gel including the triphenylmethane derivative of a specified structural formula, wherein R<sup>1</sup> is a linear or branched alkyl group having 11-18 carbon atoms, and an organic solvent. Note previously considered claim 6, as well as Example 1 on pages 12 and 13 of Applicants' specification. Claim 14 recites an organic fiber produced from the organic gel of claim 13, and having a diameter of 500 nm or less.

New claims 15-17, dependent respectively on claims 8, 11 and 13, further define the organic solvent, consistent with the description in the paragraph bridging pages 6 and 7 of Applicants' specification, and with Example 5 on page 17 thereof. Claims 18-20, dependent respectively on claims 8, 11 and 13, define a process for producing the organic gel of claims 8, 11 and 13, respectively, including heating a solution of the triphenylmethane derivative and organic solvent, and allowing the resultant solution to stand at room temperature. See, for example, the first full paragraph on page 11 of Applicants' specification; see also Example 5 on page 17 of Applicants' specification. Claims 21-23, dependent respectively on claims 8, 11 and 13, recite that the triphenylmethane derivative is swelled by the organic solvent in the organic gel; and claims 24-26, dependent respectively on claims 9, 12 and 14, recite that the organic fiber has a diameter of 100 nm or less. Note, for example, page 11 of Applicants' specification.

Applicants respectfully submit that all of the claims presented for consideration by the Examiner patentably distinguish over the teachings of the references applied by the Examiner in rejecting claims in the Office Action mailed May 13, 2009, that is, the teachings of the U.S. Patents to Garner, No. 5,688,440, and to Merrill, No. 5,377,760; Japanese Patent Document No. 2003-064346 (Kyodo); and the articles by Fan, et al., "A Urea-Incorporated Receptor for Aromatic Carboxylate Anion Recognition", in Journal of Supramolecular Chemistry 2 (2002), 247-254; by Ruelle, et al., "Nonlinear Dependence of the Solubility of Water in Hydrocarbons on the Molar Volume of the Hydrocarbon", in Journal of Solution Chemistry, Vol. 25, No. 7 (1996), pp. 657-665; by Smid, et al., "Star-Shaped Alkyl Carbamates as Pour Point Depressants", in Tribology Transactions, Vol. 40 (1997), 2, 279-282; and Chen, et al., "Micellization of and Solute Binding to Amphiphilic

Poly(ethyleneoxide) Star Polymers in Aqueous Media”, Langmuir (1996), 12, 2207-2218, under the provisions of 35 USC 102 and 35 USC 103.

Initially, in view of cancelling of claims in the above-identified application, it is respectfully submitted that the rejections over the teachings of Smid, et al. and of Chen, et al., set forth in Items 4-9 on pages 3-5 of the Office Action mailed May 13, 2009, are moot.

In connection with the other rejections in the Office Action mailed May 13, 2009, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such triphenylmethane derivative as in the present claims, having structure of the specified general formula, and with R<sup>1</sup> thereof being a linear or branched alkyl group having four carbon atoms (see claim 4), eight carbon atoms (see claim 5), and 18 carbon atoms (see claim 6).

Furthermore, it is respectfully submitted that these references as applied by the Examiner would neither have disclosed nor would have suggested such an organic gel as in the present claims, of a triphenylmethane derivative of the structure of the specified formula, and wherein R<sup>1</sup> of the specified formula is a linear or branched alkyl group having 1-5 carbon atoms (see claim 8), or 6-10 carbon atoms (see claim 11), or 11-18 carbon atoms (see claim 13); in particular, wherein the triphenylmethane derivative is swelled by the organic solvent (see claims 21-23).

Moreover, it is respectfully submitted that these references as applied by the Examiner would neither have disclosed nor would have suggested such an organic gel as in the present claims, including features as discussed previously in connection with claims 8, 11 and 13, and, additionally, wherein the organic solvent is any one selected from the group consisting of toluene, 1,1,2,2-tetrachloroethane and decalin, where the triphenylmethane derivative is that set forth in claim 8 (see claim 15);

and/or wherein the organic solvent is any one selected from the group consisting of 2-propanol and benzonitrile, when the triphenylmethane derivative is that set forth in claim 11 (see claim 16); or wherein the organic solvent is propylene carbonate, where the triphenylmethane derivative is that set forth in claim 13 (see claim 17).

Further, it is respectfully submitted that the teachings of these applied references would have neither disclosed nor would have suggested such an organic fiber as in the present claims, produced from the organic gel as defined in claims 8, 11 and 13, and wherein the organic fiber has a diameter of 500 nm or less (note, respectively, claims 9, 12 and 14); in particular, wherein such diameter is 100 nm or less (note, respectively, claims 24-26).

In addition, it is respectfully submitted that the teachings of the applied references would have neither disclosed nor would have suggested such a process for producing the organic gel as in the present claims, including, after heating a solution comprising the triphenylmethane derivative and the organic solvent, the resultant solution is allowed to stand at room temperature. Note claims 18-20.

The present claims are directed to specific triphenylmethane derivatives, organic gels and organic fibers containing triphenylmethane derivatives, and processes of forming the organic gels.

It has been desired to provide organic gels containing, as a constituent thereof, an organic solvent having a boiling point higher than that of water, since such organic gels can be used in applications in which hydrogels (gels utilizing water as a solvent) is inapplicable, as described in the paragraph bridging pages 1 and 2 of Applicants' specification.

Organic gels are generally more difficult to produce as compared to hydrogels, and various previously proposed organic gels have required relatively

complex procedures for forming such gels, and/or the obtained gels have problems such as discoloration and insufficient gelling performance, or the procedures for forming such gels cause corrosion of equipment used. Note item [0003] on page 2 of Applicants' specification.

Against this background, and as a result of intensive and extensive researches by the present inventors, for finding an organic gel and organic gelling agent exhibiting a high gelling performance capable of readily gelling an organic solvent without the need of adding a secondary component, the present inventors have come up with the present invention. Specifically, Applicants have found specific triphenylmethane derivatives containing a urea bond therein, that exhibit excellent properties as a gelling agent, and can be used in producing an organic fiber having a length of several tens nanometers. Thus, Applicants have found specific novel triphenylmethane derivatives, as well as use of various triphenylmethane derivatives as gelling agents in forming organic gels and organic fibers.

Note that the triphenylmethane derivatives utilized in forming organic gels according to the present invention are capable of gelling various organic solvents, depending on  $R^1$  of the derivative. That is, when  $R^1$  is a linear or branched alkyl group having 1-5 carbon atoms, a high gelling performance capable of gelling high-polar solvents such as propylene carbonate is achieved. When  $R^1$  is a linear or branched alkyl group having 6-10 carbon atoms, the triphenylmethane derivatives are capable of gelling polar solvents such as isopropanol; and when  $R^1$  is a linear or branched alkyl group having 11-20 carbon atoms, the compounds exhibit a high gelling performance capable of gelling hydrophobic solvents such as toluene and decalin. That is, agents of the present invention are capable of gelling various polar

solvents by varying the kinds of side chains in these compounds. Note, in particular, the paragraph bridging pages 6 and 7 of Applicants' specification.

It is emphasized that the various triphenylmethane derivatives used in forming organic gels according to the present invention can exhibit a capability of gelling an organic solvent even when used in a small amount, notwithstanding that the derivatives are low-molecular weight compounds. The resultant organic gels are useful as materials usable under a high-temperature condition, as described in the first full paragraph on page 18 of Applicants' specification. In addition, an organic nanofiber can be produced from the derivatives by a very simple process, and such nanofiber can be applied to wiring materials for electronic devices such as metallic nano wires produced by using the organic nanofiber as a template, among other uses, as described in the second paragraph on page 18 of Applicants' specification.

In connection with the rejection set forth in Items 2 and 3 on pages 2 and 3 of the Office Action mailed May 13, 2009, Fan discloses a neutral urea incorporated anion receptor 1 with a tripodal pseudocavity, synthesized in good yield. The article reports on the binding properties of the receptor 1 with large terephthalate and trimesylate anions using  $^1\text{H}$  NMR and luminescence titration methods. Note the first full paragraph in the right-hand column on page 247 of this article. Note receptor 1 at the top of page 248 of this article. Note also the paragraph bridging the left- and right-hand columns on page 249, describing binding affinity of the receptor 1. Note also the Conclusions in the left-hand column on page 253 of this article.

Referring to receptor 1 on page 248 of this article, the substituents on "N" are an alkyl group having 6 carbon atoms. It is respectfully submitted that such disclosure in Fan, et al. would have neither disclosed nor would have suggested such triphenylmethane derivative as in claim 5, wherein  $\text{R}^1$  is a linear or branched

alkyl group having 8 carbon atoms, and advantages thereof wherein such derivative can be used in an organic gel as discussed in the foregoing.

In connection with the subject matter of present claims 4-6, it is respectfully submitted that the additional teachings of Ruelle, et al. would not have rectified the deficiencies of Fan, et al., such that the presently claimed invention as a whole would have been obvious to one of ordinary skill in the art.

Ruelle, et al. discloses solubility of water in 50 hydrocarbon solvents at 20°C, estimated by means of a solubility equation derived from the thermodynamics of mobile order in H-bonded liquids. Thus, this article reports on predictions of solubility of water in 50 saturated and unsaturated hydrocarbons, and compares theoretical values to experimental values. Note the Abstract of this article; see also the first paragraph on page 659 thereof. Note also Table 1 on pages 661 and 662 of this article, showing predicted and experimental solubilities; and the paragraph bridging pages 663 and 664, and the sole full paragraph on page 664, of this article, describing that it is the mixing entropy that rules water solubility dependence on the solvent molar volume in hydrocarbons, with the order of magnitude of the solubility of water in hydrocarbons being determined by the enthalpic contribution related to the breaking of the net of hydrogen bonds in water.

Initially, it is respectfully submitted that one of ordinary skill in the art concerned with in Fan, et al., would not have looked to the teachings of Ruelle, et al. In connection therewith, it is emphasized that Ruelle, et al. discloses solubility of water in various hydrocarbon solvents; and it is respectfully submitted that one of ordinary skill in the art concerned with in Fan, et al., directed to binding properties of the receptor 1 and binding efficiencies of receptors 1 and 2, would not have looked to the solubility of water in hydrocarbons as described in Ruelle, et al.

In any event, even assuming, arguendo, that the teachings of Fan, et al. and of Ruelle, et al. were properly combinable, such combined teachings would have neither disclosed nor would have suggested the triphenylmethane derivatives of claims 4-6, having the R<sup>1</sup> as in these claims, and advantages thereof in use of these derivatives as a gelling agent in organic gels.

It is respectfully submitted that the combined teachings of Fan, et al. and of Garner would have neither disclosed nor would have suggested the presently claimed subject matter.

Fan, et al. has been previously been discussed.

Garner discloses a method for gelling an organic liquid comprising dissolving an effective amount of an aryl cyclohexanol gelling agent in an organic liquid, and cooling the resultant mixture to form a gel. This patent goes on to describe that heating may be necessary to facilitate dissolution of the gelling agent. Note column 1, lines 59-67 of this patent. As to what is meant by aryl cyclohexanol gelling agent, see column 2, lines 1-3 of this patent. Note also column 2, lines 11-15 and 28-35 of this patent document, and column 3, lines 36-44, describing various gelling agents.

Initially, it is emphasized that Fan, et al. is directed to binding properties of various receptors, while Garner discloses organic gelation agents. In view of differences in technology in these two references, it is respectfully submitted that one of ordinary skill in the art concerned with in Fan, et al. would not have looked to the teachings of Garner. In other words, these references are directed to non-analogous arts.

Again emphasizing the disclosure of Fan, et al. as reporting on binding properties of the receptor 1, it is respectfully submitted that there would have been

no reason to combine the teachings of Garner with the teachings of Fan, et al., absent hindsight use of Applicants' disclosure, which of course is improper under the guidelines of 35 USC 103.

In any event, even assuming, arguendo, that the teachings of Fan, et al. and of Garner were properly combinable, such combined teachings would have neither disclosed nor would have suggested the organic gel or organic fiber, or process for producing the organic gel, as in the present claims, and advantages thereof as discussed in the foregoing, including use of the triphenylmethane derivative, especially with R<sup>1</sup>, and other features as discussed in the foregoing.

In connection with the rejection of claims 9 and 12, Merrill discloses a gel of the type useful in improving the conformance of formations encountered in the drilling and production of hydrocarbons from subterranean wells, relating to gels which are capable of blocking or plugging relatively large openings in permeable formations. This patent discloses that an opening in a subterranean formation is plugged by providing a gelation solution comprised of a water soluble crosslinkable polymer and a crosslinking agent, introducing reinforcing fibers into the gelation solution, injecting the fiber-containing solution into the opening to be plugged and crosslinking the gelation solution substantially to completion to form a fiber-reinforced crosslinked gel in the opening. See column 2, lines 39-47. Note also the last paragraph in column 2; and column 3, lines 10-17, of this patent. Note also column 4, lines 14-18, further describing the reinforcing fibers incorporated in the gel.

Again noting the report of Fan, et al., directed to the aforementioned binding properties, while Garner is directed to organic gelation agents and Merrill is directed to fiber-reinforced gels, it is respectfully submitted that one of ordinary skill in the art

concerned with in Fan, et al., would not have looked to the teachings of Garner or Merrill, absent hindsight use of Applicants' disclosure.

In any event, even assuming, arguendo, that the teachings of Fan, et al., Garner and Merrill were properly combinable, such combined teachings would have neither disclosed nor would have suggested the organic fiber as in the present claims, produced from the organic gel. That is, it is emphasized that according to the present invention the organic fiber is produced from the organic gel; and it is emphasized that the reinforcing fibers in Merrill which are, for example, glass or cellulosic fibers, would have neither taught nor would have suggested the organic fibers produced from the organic gel as in the present claims, much less having a diameter as in the present claims.

Kyodo discloses gelling agents for organic liquids, comprising diurea compounds as seen in the formulas (1) and (2) in paragraph [0005] of this document. Note that  $R_1$  and  $R_2$  of the diurea compound are each a linear or branched alkyl group each expressed by the formula  $C_mH_{2m+1}$  and  $C_nH_{2n+1}$ , with  $m$  and  $n$  each being an integer of 1-40,  $m+n=25-40$  in the formula (1) and  $m+n=12-40$  in the formula (2).

Fan, et al., Garner and Merrill have been previously discussed.

Again emphasizing the disclosure of Fan, et al. reporting binding properties of the receptor 1 with large terephthalate and trimesylate anions, while Kyodo discloses gelling agents, it is respectfully submitted that one of ordinary skill in the art concerned with in Kyodo would not have looked to the teachings of Fan, et al. Absent Applicants' disclosure, there would have been no reason for combining the teachings of Kyodo and Fan, et al.

In any event, emphasizing that Kyodo discloses diphenylmethane urea derivatives, not triphenylmethane derivatives, it is respectfully submitted that there

would have been no disclosure, or suggestion, of triphenylmethane derivatives as in the present invention as a substitute for the gelling agent in Kyodo.

As discussed in connection with the previous rejection using the teachings of Garner, or of both Garner and Merrill, it is respectfully submitted that the teachings of these references as applied by the Examiner, even together with the teachings of Kyodo and Fan, et al., would have neither disclosed nor would have suggested the presently claimed invention, including the organic gel and organic fiber produced from such organic gel, or use of the triphenylmethane derivative, especially as in claims 8 and 13, as in the present claims.

The contention by the Examiner in lines 4-9 on page 8 of the Office Action mailed May 13, 2009, with respect to the teachings of Fan, et al., is noted. While the Examiner refers to "hydrogen bonding", it is respectfully submitted that known mechanisms of gelation are different. It is respectfully submitted that various other factors, for example, Van der Waals forces, among the molecules, have an effect on gelation, the gelling agent losing fluidity and a solvent being caught in the gelling agent, whereby gelation occurs. It is important whether a three-dimensional network of the gelling agent is formed that traps the solvent between strands of the network. That is, for gelation it is important that strands be made among the molecules of the gelling agent. It is respectfully submitted that there is not evidence that hydrogen bonding between a gelling agent and a solvent is causative for the mechanism of gelation. It is respectfully submitted that the Examiner has not set forth a proper basis for the conclusion of obviousness from the teachings of Fan, et al.

In addition, it is emphasized that Kyodo discloses diphenylmethane urea, not triphenylmethane urea, derivatives. It is respectfully submitted that one of ordinary skill in the art could not predict from the document of Kyodo, whether the necessary

strands for gelation are made in triphenylmethane urea. Only through hindsight use of Applicants' disclosure, improper under the guidelines of 35 USC 103, would one of ordinary skill in the art have known that the necessary strands of the network for trapping the solvent are made in triphenylmethane urea. Thus, it is respectfully submitted that the teachings of Kyodo, even together with the teachings of the other references as applied by the Examiner, would have neither disclosed nor would have suggested the presently claimed invention, and in particular the organic gel and organic fiber produced from such organic gel, as in various of the present claims.

In view of the foregoing comments and amendments, reconsideration and allowance of all claims presently pending in the above-identified application are respectfully requested.

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Respectfully submitted,

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